Nutritional behaviors in pre-diabetic patients and differences in stages of change" decisional balance" self-efficacy and process of change based on trans-theoretical model in Yazd-Iran

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Abstract

Objective *(Background):* Impaired fasting glucose (IFG) and Impaired glucose tolerance (IGT) are considered to constitute "pre-diabetes."[1] and are now recognized as pre-diabetes states. [2] which is characterized by elevated blood glucose levels with either fasting plasma glucose between 100 and 125.[3] Pre-diabetes prevalence varied by age, sex, and race/ethnicity, and there was considerable discordance between measures of pre-diabetes.[4] Subjects with IFG/IGT have an increased risk of developing diabetes and a higher prevalence of cardiovascular disease than normoglycemic individuals.[5] Men and women with pre-diabetes were significantly older; had significantly higher BMI.[6]Research suggests that PD is associated with an increased risk of developing diabetes.[3] Obesity-associated diabetes in adolescents is increasing throughout the world.[7] The Stages of Change Model has been used in interventions as a way of assessing and measuring participants' readiness for change. [8] Therefore, pre-diabetes is a condition in which primary prevention efforts through lifestyle modification are particularly important.[9]This study identifies pre-diabetes related characteristics of individuals at different stages of readiness to change to healthy eating. The objective of the current study is to determine nutritional behaviors of Pre-Diabetic persons based on Trans-theoretical model and relationships between nutrition behaviors and BMI among a population of Pre-diabetes adults in Yazd - Iran. Achieving glycemic control in patients with pre-diabetes through lifestyle and pharmacologic interventions can effectively prevent or delay the development of diabetes and its associated complications. The first step, however, is to identify patients at risk.

Research design and methods: Stage based differences in demographic, eating related, health care utilization, were examined in a sample of 220 pre-diabetic individuals aged thirty and above from health centers Yazd City. Validity of questionnaires was assessed by face & content method. Test retest and internal consistency methods were used for reliability of stages of change questionnaire and for nutritional knowledge scale respectively. The internal consistency of knowledge scale was high (Cronbach alpha= .73). Data was analyzed using SPSS17 using central indexes tests. We used fasting plasma glucose test to assess the IFG and pre-diabetes and used the Trans-theoretical Model (TTM) to estimate the nutritional behaviors. The TTM has recently provided insight into dietary changes regarding reducing fat, increasing fiber and losing weight. Participants completed validated questionnaires to assess the constructs of the TTM. This assessed where the patient was in the stage of change cycle, motivation to nutritional behaviors, how easy they thought this would be and attendance rate. Inclusions criteria were ability to read and understand Persian. A 5-point Likert scale was used; 1 being not at all confident and 5 being very confident.

Results: For pre-diabetic participants, sex, percent calories from fat, carbohydrate and protein differed across stages. Those in Pre-action stages were more likely than action and Social support was highest for those in the contemplation stage and lowest for those in the action stage. The majority of participants were in the Pre-action stages.

Conclusions: These data validate the Trans-theoretical Model, where those in the action stages displayed healthier eating. Pre-contemplators and contemplators were a heterogeneous group and may need individually tailored interventions. Nutritional Behavior is important in preventing diabetes. It is, therefore, important at all levels of diabetes prevention.

Key words: Stages of Change Model, Trans-theoretical Model, Nutrition, Pre-diabetes

Background

Pre-diabetes broadly refers to an intermediate stage between completely normal glucose levels and the clinical entity of type 2 diabetes, encompassing both IFG and impaired glucose tolerance (IGT). As defined by the American Diabetes Association (ADA), pre-diabetes is a FPG of at least 100 mg/dl but less than 126 mg/dl, which is frequently termed IFG.[10] The progression from pre-diabetes to type 2 diabetes occurs over many years, strong evidence to support intervention to delay the progression from pre-diabetes to diabetes.[10] By definition, pre-diabetes is a condition where one has fasting blood sugar levels above normal (blood sugar between 100-125 mg/dl) but the blood sugar levels are not high enough to diagnose diabetes (fasting blood sugar above 126 mg/dl). recognition of pre-diabetes is important to identify individuals who have risks that can be modified to improve outcomes.[11] Pre-diabetes was highly prevalent among adults.

The macronutrient composition and the caloric content of our diet are major determinants of glucose homeostasis and there is a continuously growing list of foods, nutrients or individual compounds that have been associated with an increased or reduced incidence of diabetes mellitus. These include fat, carbohydrates, fiber and other micronutrients or individual dietary compounds, which have been shown to either promote or prevent a progression towards a Pre-diabetes.

The trans-theoretical model of behavior change the 'Stages of Change' by Prochaska & Di Clemente (1982) has become one of the most influential theoretical models within health psychology. The model proposes that people move through 5 stages of "readiness to change" (the Stages of Change), as they adopt a new behavior.[12] Characterized by treating behavior change as a dynamic process, it has recently been applied to diabetes mellitus.[13] Prochaska *et al*. TTM is the most widely used stages of behavior change theory in the field of health promotion. The model has been successfully applied to a variety of health-related behaviors, including smoking, physical activity and nutrition habits.[14]The evidence for using stage-based interventions is rated as suggestive in the areas of fruit and vegetable consumption and dietary fat reduction. Valid and reliable staging algorithms are available for fruit and vegetable consumption and dietary fat intake, and are being developed for other dietary behaviors. Few assessment tools have been developed for other TTM constructs.[15] Basic research has generated a rule of thumb for at-risk populations: 40% in precontemplation, 40% in contemplation, and 20% in preparation. Across 12 health behaviors, consistent patterns have been found between the pros and cons of changing and the stages of change. [16] Systematic reviews in this field show how the TTM has been widely applied to multiple health-change behaviors, such as substance abuse, diabetes mellitus, or exercise. However, more recently, there has been growing interest in applying the TTM to weight management in overweight and obese patients.[17]The trans-theoretical model is useful for understanding the decision-making process involved in dietary behavior change.[18]

Core constructs

The model is composed of four constructs: (1) *stages of change,* the temporal readiness to modify health behavior; (2) *decisional balance,* the relative importance of the perceived pros and cons of change; (3) *situational, self-efficacy,* confidence in one's ability to modify behavior across positive social, negative effect, and difficult situations; and (4) *processes of change,* the experiential and behavioral strategies individuals use to progress through the stages of change.[19]According to the TTM, health behavior change involves progression through five stages: (1) pre-contemplation, no intention of changing behavior in the foreseeable future (defined as the next 6 months); (2) contemplation, intending to change within the next 6 months; (3) preparation, intending to change within the imme-

diate future (defined as the next month); (4) action, behavior change has been made within the past 6 months; and (5) maintenance, changes have been made and sustained for 6 months or longer.[19] Each stage of change tends to be characterized by the use of specific processes. Experiential strategies are used most frequently by individuals in the contemplation and preparation stages of change. Behavioral processes are used most frequently by individuals in the action and maintenance stages. This model is referred to as "Trans-theoretical" because it encompasses many theories of behavior change.[20] Stages of change lie at the heart of the TTM.[21] They are the common strategies or techniques, emerging from a comparative analysis of various psychotherapeutic approaches (Prochaska, 1979) that can be used to change behavior. For example, `consciousness raising', from the Freudian tradition, involves gaining an awareness or understanding of the problem, and `reinforcement management', from the Skinnerian tradition, involves increasing the rewards for the healthy behavior, and reducing the rewards for the unhealthy behavior. Other processes involve self-reappraisal, supportive relationships, and commitment. Research across a number of behaviors (including smoking, weight control, psychological distress, exercise, alcohol abuse) demonstrates that precontemplators infrequently use all processes, that use of those processes which involve gaining insight and understanding (experiential processes, or emotional or cognitive strategies) increases in contemplation and peaks in the preparation stage, while those in action and maintenance are more likely to use behavioral processes.[22]

Process of Change

Processes of change are the experiential and behavioral activities that people use to progress through the stages. It is important for all practitioners of population health to understand these progressions. Ten processes have received the most empirical support in our research to date.[21]

- *Consciousness Raising*- Consciousness raising involves increased awareness about the causes, Consequences, and cures for a particular problem behavior. [21]
- *Dramatic Relief* -Dramatic relief initially produces increased emotional experiences followed by reduced affect or anticipated relief if appropriate action is taken.[21]
- *Environmental Reevaluation* - Environmental reevaluation combines both affective and cognitive assessments of how the presence or absence of a personal habit affects one's social environment. It can also include the awareness that one can serve as a positive or negative role model for others. [21]
- *Self-Reevaluation* - Self-reevaluation combines both cognitive and affective assessments of one's self-image with and without a particular unhealthy habit.
- Self-reevaluation. During interaction with a patient, the provider might ask, "Imagine you were free from smoking. How would you feel about yourself?"[21]
- *Self-Liberation* -Self-liberation is both the belief that one can change and the commitment, as well as the recommitment, to act on that belief. Encouraging patients to make New Year's resolutions, public testimonies, or a contract are ways of enhancing willpower. The provider might say, "Telling others about your commitment to take action can strengthen your willpower. Who are you going to tell?"[21]
- *Social Liberation*- Social liberation requires an increase in social opportunities or alternatives, especially for patients who are relatively deprived or oppressed. [21]
- *Counter conditioning* -Counter conditioning requires learning healthy behaviors as substitutes for problem behaviors.[21]
- *Helping Relationships* - Helping relationships combine caring, trust, openness, and acceptance, as well as support for healthy behavior change. Rapport building, a therapeutic alliance, supportive calls, and buddy systems can be sources of social support that healthcare providers could offer. [21]
- *Reinforcement Management* - Reinforcement management provides consequences for taking steps in a positive direction. While contingency management can include the use of punishment, we found that self-changers rely on reward much more than punishment. So, we recommend that healthcare providers emphasize reinforce-

ment because a philosophy of the stage model is to work in harmony with how people change naturally.[21]

- *Stimulus Control* -Stimulus control removes cues for unhealthy habits and adds prompts for healthier alternatives. [21]

Decisional Balance

Decisional balance was a variable in the construct validity regression models. It reflects the perceived balance of benefits (pros) compared with costs (cons) of engaging in a behavior change along the SOC continuum. The pros have been demonstrated to increase progressively and the cons to decrease as the SOC moves toward action for a variety of health-related behaviors. Decisional balance was assessed by asking respondents how important each of the listed pros and cons(4 pros and 4 cons items) was in their decision to nutritional behaviors using five-point Likert scales ranging from -2 (*not at all important*) to 2 (*very important*).

Self-efficacy

According to Bandura, "perceived self-efficacy is defined as people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is not concerned with the skills one has." Self-efficacy theory suggests that goals should be attainable in the near future, because immediate success can provide motivation and enhance efficacy. [23] Self-efficacy was assessed by asking respondents to rate on five-point Likert scales ranging from -2 (*very difficult*) to 2 (*very easy*), how difficult or easy they find it to eat according to the situations, for each of dietary behaviors.

The relevant model tenet for the instrument development reported here states that the concepts of SE, decisional balance, knowledge, and contextual factors are predictive of stage of change (SOC) and actual nutritional behaviors participation. The concepts of SE (confidence or temptation in the face of challenging circumstances), decisional balance (weighing pros and cons), and SOC (pre-contemplation, contemplation, preparation, action, and maintenance) are from the Trans-theoretical Model (TTM). Conceptually based models such as the TTM have demonstrated explanatory ability (40%-80%) for a variety of health behaviors. The SE concept is associated positively with mammography screening and other health-related behaviors (e.g., condom usage, contraceptive usage, drinking and driving, smoking cessation, and vegetable and fruit consumption).[24]

Self-efficacy (confidence to perform the new behavior) and decisional balance (relative importance of the perceived pros and cons of adopting the new behavior) constructs are shared by a number of continuum theories (e.g. social learning theory, theory of planned behavior, health belief model). The pros and cons of change are the individual's perceptions of the actual consequences of changing high-risk behaviors. In the TTM, self-efficacy is conceptualized not only as confidence in ability to change the risk behavior, but also as temptation to continue the risk behavior.[22]

Relationship between Stages and Process of Change

One of the earliest empirical integrations was the discovery of systematic relationships between the stages people were in and the processes they were applying. This discovery allowed an integration of processes from theories that were typically seen as incompatible and in conflict. For example, the Freudian theory relied almost entirely on consciousness raising for producing change. This theory was viewed as incompatible with Skinnerian theory that relied entirely on reinforcement management for modifying behavior. But self-changers did not know that these processes were theoretically incompatible and their behavior revealed that processes from very different theories needed to be emphasized at different stages of change. This integration suggests that, in early stages of population health management, efforts should support the application of cognitive, affective, and evaluative processes to progress through the stages. In later stages, these programs should rely more on commitments, conditioning, rewards, environmental controls, and support to progress toward maintenance or termination.[21]

The application of TTM in the diabetes context has been defended on the grounds that persons with diabetes who have been classified within the action or maintenance stages have been observed to display healthier eating patterns than those at other stages. [25]

The concept of pre-diabetes has been discussed since the 1950's. After 1980, WHO expert guidelines on the classification of diabetes according to its stages of development became common. These guidelines also included statistically significant risk groups with diabetes likely to develop in the future. The term Impaired Glucose Tolerance (IGT) was officially introduced by WHO in 1979, with an additional category referring to changes in glucose metabolism to be included later on--the Impaired Fasting Glucose - IFG. The term pre-diabetes mellitus began to be used again after 2000, and after 2003 diagnostic criteria to delimit diabetes and pre-diabetes came into use.[26]

Obesity is associated with an increased risk of developing insulin resistance and type 2 diabetes mellitus (T2DM). It is important to note the progressive nature of pre-diabetes and T2DM when obesity is not treated.[27] Knowledge of the risk factors and protective factors associated with type 2 diabetes is essential for the development of prevention strategies. Diet is thought to have an important influence on the development of diabetes.[28] Although diet and nutrition are widely believed to play an important part in the development of Type II (non-insulin-dependent) diabetes mellitus, specific dietary factors have not been clearly defined. Much controversy exists about the relations between the amount and types of dietary fat and carbohydrate and the risk of diabetes.[29]

Data analysis

Data was analyzed using SPSS version 17. Noar and Zimmerman suggested that contemplation/preparation stages might be comparable to positive behavioral intentions.[30] *T*-tests and chi-square tests were used to test for differences in demographic characteristics between all stages. Analysis of variance was conducted to determine differences across stage for each construct.

Measures

TTM measures for dietary behaviors were used. Participants were classified into one of the five stages of change for dietary behaviors using a validated staging algorithm. The construct of self-efficacy was assessed using a seven-item Likert scale of the temptation to eat foods across a variety of challenging situations. The two constructs of decisional balance were measured with a eight-item, five-point Likert scale that assessed the relative importance given to the pros and cons when making a decision whether to dietary behaviors. The processes of change were quantified using 60 items that assessed the frequency of process use. This scale included 10 constructs: (i) consciousness raising (CR) about unhealthful dietary behavior, (ii) dramatic relief (DR), using feelings to help motivate healthful dietary behavior; (iii) environmental reevaluation (ER), assessing the impact unhealthful dietary behavior has on others; (iv) self-reevaluation (SR), reassessing thoughts and feelings about oneself as a person with unhealthful dietary behavior; (v) social-liberation (SO), becoming aware of changes in the environment that influence dietary behavior patterns; (vi) self-liberation (SL), recognizing choices and making a commitment to healthful dietary behavior; (vii) helping relationships (HR), seeking and accepting support from others to healthful dietary behavior; (viii) reinforcement management (RM), rewarding oneself or being rewarded for healthful dietary behaviors; (ix) counter conditioning (CC), substituting other thoughts and healthful dietary behaviors in place of unhealthful ones, and (x) stimulus control (SC), avoiding situations, places or things that trigger excess consumption of foods .

BMI

Height and weight measurements were taken by trained research staff using standardized protocols. [31]adults wore light clothing and no shoes. Adults ' weights were measured to the nearest 0.1 kg using a digital scale and heights were measured to the nearest 0.1 cm using a free-standing portable stadiometer. Body mass index (BMI) was calculated as weight (kilograms) divided by height (meters) squared. Weight status (obese, overweight, and normal weight) was defined using international definitions for Adults.

Nutrition behaviors

The nutrition behaviors chosen for analyses were selected because of the available evidence in Yazd health centers, which indicates these behaviors as correlates of overweight, obesity and Pre-diabetes. *Daily consumption* was assessed with the question, participants were asked about their

usual daily *consumption* separately with the Food recall in the last 3 days and Food frequency, 'How many serves of food do you usually eat each day?' *Fast food/takeaway food consumption* was assessed with the question, 'How often do you usually eat food from a takeaway? Consumption of *snacks* that were high in fat or high in sugar was assessed with questions about the frequency of eating fried foods or chocolates, sweets, or ice cream and ets. *Soft drink consumption* was estimated with questions: 'In the last3 days (including time spent at home), on how many days did you have regular (non-diet) soft drinks?' and how many glasses or cans of soft drinks did you have? Average soft drink consumption was estimated by multiplying the number of days soft drinks were consumed by the previous day's consumption and then averaged over the previous 3 days.

A weight-control strategy might include: choosing low-fat, low-calorie foods, eating smaller portions, drinking water instead of sugary drinks, being physically active [32]

Results

In our sample, approximately (34.5%) was classified as pre-contemplators, (32.3%) as contemplators, (15.9%) in preparation, (7.3%) in action and (10%) in maintenance. (75%) of persons were female and (25%) male. (47.7%) were overweight, (32.3 %) Obesity grade 1, (8.6 %) Obesity grade 2, (0.9 %) Obesity grade3 and only (10.5%) were normal weight. (65.5 %) have primary education, (21.8 %) secondary and (12.7%) an academic degree. Decisional balance in 61.4% of participants was high and 12.3% was excellent. Self -efficacy in (31.4 %) of participants was high and (58.2%) was excellent. Process of change behavior in (o.9%) was low, (13.2%) average, (63.2%) high and (22.7%) was excellent . Examination of the nutritional correlates of BMI in our sample found inverse relationships between BMI and consumption of high-fat/high-sugar foods and positive relationships between BMI and eating 5 or more food a day. Patients aged 50–80 years had a lower rate than those aged 30–50 years. Overweight Patients had higher rate than those with normal weight. Adherence to the prescribed diet (<30% caloric intake from fat, ~55% from CHO, and ~15% from protein and <300 mg·d™1 cholesterol intake) was monitored with 3-day food records by a study dietician but in our study were 30-50% caloric intake from fat, 40-60% from CHO, and 10-15% from protein.(see Fig 1,2,3) Participants in action-maintenance stages evidenced higher pros, self-efficacy, and fruit and vegetable consumption and significantly lower cons than did, participants in pre-contemplation and contemplation-preparation stages. Also, participants in action-maintenance stages used processes of change more frequently than did those in pre-contemplation-contemplation-preparation stages. The use of experiential and behavioral processes within these stages did not differ significantly, as posited.

Dietary applications of the TTM have found individuals in action and maintenance stages to have higher self-efficacy than those in pre-action stages of change. An examination of the use of change processes across nine problem areas found that experiential processes were used more in the earlier stages (pre-contemplation through preparation), whereas behavioral processes were used more in later stages of change (action and maintenance).[19]

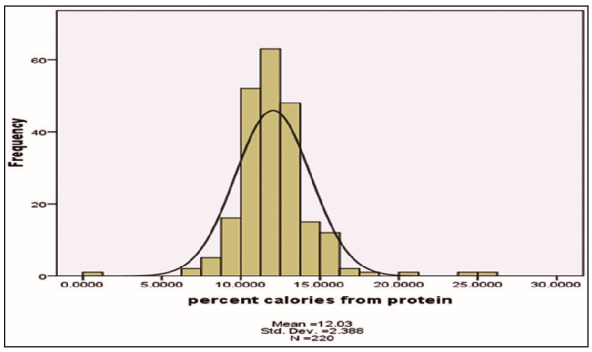
The measurement structure of decisional balance, relative magnitude of the pros and cons within stages, and shifts in the pros and cons across stages were consistent with theory. Across behaviors, the average increase in pros was greater than the average decrease in cons from pre-contemplation to action stages.[18]

Conclusion

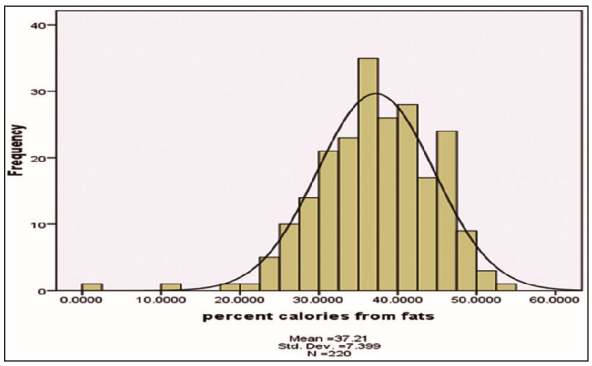
Evidence from this study would suggest that the stages of change model may help identify motivated patients if used as a questionnaire tool. Stage theories specify an ordered set of 'stages of readiness to change' into which people can be classified and identify the factors that can facilitate movement from one stage to the next. If eating behavior change follows a stage process, then nutritionists could identify the predominant stage or stages in a population and focus resources on those issues most likely to move people to the next stage (e.g. from no intention of changing, to thinking about changing). In addressing this question, the review draws on the defining characteristics of stage theories as clarified by Weinstein et al.

(1998), provides an in-depth coverage of methodological considerations, and a detailed summary table of dietary studies applying the TTM. Specific recommendations are made for improving the accuracy of dietary stage classifications.[33] Elements of the trans-theoretical model offer promise in developing effective health behavior change interventions.[34]. Differences across stage of change were found for nutritional behaviors, self-efficacy, pros of more nutritional behaviors and processes of change. Nutritional behaviors, self-efficacy and the pros of more healthy nutrition were greater in the maintenance than contemplation stage. Stage differences in processes were: consciousness raising (increased contemplation to action), self-liberation (increased contemplation to maintenance), helping relationships (increased preparation to maintenance), counter conditioning (increased contemplation to preparation, action and maintenance) and reinforcement management (increased contemplation and preparation to maintenance). Experiential processes were used more than behavioral processes in the preparation stage. The Trans-theoretical Model is a dynamic theory of change and it must remain open to modifications and enhancements as more students, scientists, and practitioners apply the stage paradigm to a growing number of diverse theoretical issues, public health problems, and at-risk populations.[21] The term "pre-diabetes" has recently been adopted internationally to describe many of these conditions, but no national or international management guidelines have been published.[35]

Little research has given consideration to how people's weight control behaviors may moderate the relationships between nutrition and body mass index (BMI) in large cross-sectional studies.[31] Studies from around the world have shown that dietary modification for the prevention of T2DM can be successful; however which dietary factors are important remains to be fully elucidated. Indeed there is now overwhelming evidence to conclude that lifestyle modification can prevent or delay the onset of T2DM.[36] It is widely accepted that obesity is the single most important risk factor for T2DM; being overweight, having abdominal fat distribution, and obesity account for around 90% of all T2DM cases. Guidelines emphasis the need to maintain a healthy weight (BMI <25 kg/m^2) or for those overweight to reduce weight to prevent T2DM.[36] The Diabetes UK 2011 guidelines place an emphasis on carbohydrate management and a more flexible approach to weight loss, unlike previous guidelines which were expressed in terms of recommendations for individual nutrient intakes.[37]Almost everyone who develops type 2 diabetes develops pre-diabetes first. But not everyone who has pre-diabetes -defined as having levels of glucose (a type of sugar in the blood) that are higher than normal but not yet diabetic - ends up with diabetes. In fact, changing your lifestyle can significantly delay or even prevent type 2 diabetes.[38]



Picture 1



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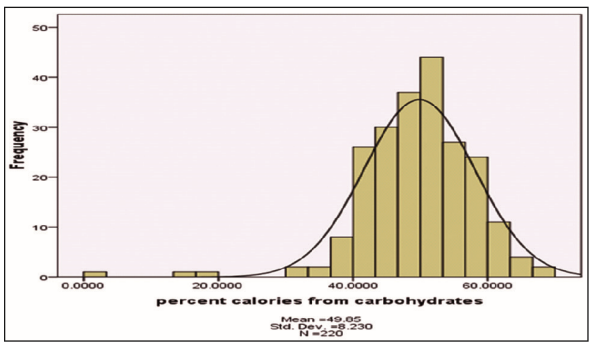

Picture 3

Table 1. Stage of change (SOC), Process of Change Behavior (POCB), Decisional Balance (DB) and Self Efficacy (SE)

(SE) **Self Efficacy**	(DB) **Decisional Balance**	(POCB) **Process of Change Behavior**		**stage of change**(SOC)					**Total**
				1*	2**	3***	4****	5*****	
Low	excellent	POCB	low	1					1
		Total							1
Average	average	POCB	low	1	0				1
			average	1	1				2
			high	1	0				1
		Total							4
	high	POCB	average	3	0	0	1		4
			high	4	5	2	0		11
		Total							15
	excellent	POCB	average	1	1				2
			high	1	0				1
		Total							3
High	very low	POCB	excellent	1					1
		Total							1
	low	POCB	high					1	1
		Total							1
	average	POCB	average	1	0	0	0	0	1
			high	3	3	0	1	1	8
			excellent	0	0	1	0	0	1
		Total							10
	high	POCB	average	1	4	0	0	1	6
			high	18	11	7	2	1	39
			excellent	1	2	0	0	0	3
		Total							48
	excellent	POCB	high	4	1	0			5
			excellent	1	2	1			4
		Total							9
Excellent	average	POCB	average	3	1	0	0	1	5
			high	3	9	6	1	3	22
			excellent	5	4	4	2	0	15
		Total							42
	high	POCB	average	3	3	2	0	0	8
			high	12	10	5	6	8	41
			excellent	3	7	6	3	4	23
		Total							72
	excellent	POCB	average	0	1	0		0	1
			high	3	5	1		1	10
			excellent	1	1	0		1	3
		Total							14

**1= Pre contemplation **2=Contemplation ***3=Preparation ****4= Action *****5= Maintenance*

Table 2. Stage of change (SOC), sex, Decisional Balance (DB) and Self Efficacy(SE)

(DB) Decisional Balance	(SE) Self Efficacy	SOC stage of change		sex		Total
				male	female	
very low	high	stage of change	1*		1	1
		Total				1
low	high	stage of change	5* * ***		1	1
		Total				1
average	average	stage of change	1	2	1	3
			2**	0	1	1
		Total				4
	high	stage of change	1	1	3	4
			2	0	3	3
			3* * *	0	1	1
			4* * **	0	1	1
			5	0	1	1
		Total				10
	excellent	stage of change	1	2	9	11
			2	4	10	14
			3	3	7	10
			4	0	3	3
			5	1	3	4
		Total				42
high	average	stage of change	1	1	6	7
			2	1	4	5
			3	1	1	2
			4	1	0	1
		Total				15
	high	stage of change	1	5	15	20
			2	4	13	17
			3	1	6	7
			4	0	2	2
			5	1	1	2
		Total				48
	excellent	stage of change	1	3	15	18
			2	7	13	20
			3	3	10	13
			4	4	5	9
			5	3	9	12
		Total				72
excellent	low	stage of change	1		1	1
		Total			1	1
	average	stage of change	1	1	1	2
			2	0	1	1
		Total				3
	high	stage of change	1	1	4	5
			2	2	1	3
			3	0	1	1
		Total				9
	excellent	stage of change	1	0	4	4
			2	2	5	7
			3	0	1	1
			5	1	1	2
		Total				14

**1 = Pre contemplation **2 = Contemplation ***3 = Preparation ****4 = Action *****5 = Maintenance*

Table 3. Stage of change (SOC), Body Mass Index (BMI), Decisional Balance (DB) and Self Efficacy (SE)

(DB) Decisional Balance	(SE) Self Efficacy	(SOC) stage of change		Body Mass Index(BMI)					Total
				20-24.99	25-29.99	30-34.99	35-39.99	>40	
very low	high	stage of change	1*		1				1
		Total							1
low	high	stage of change	5*****				1		1
		Total							1
average	average	stage of change	1	1		1	1		3
			2**	1		0	0		1
		Total							4
	high	stage of change	1		3	1	0		4
			2		1	1	1		3
			3* * *		1	0	0		1
			4* * **		1	0	0		1
			5		0	1	0		1
		Total							10
	excellent	stage of change	1	0	4	5	2	0	11
			2	1	6	4	2	1	14
			3	2	3	4	1	0	10
			4	1	1	0	1	0	3
			5	0	2	1	1	0	4
		Total							42
high	average	stage of change	1	0	4	3			7
			2	1	3	1			5
			3	1	0	1			2
			4	0	0	1			1
		Total							15
	high	stage of change	1	1	13	5	0	1	20
			2	2	6	7	2	0	17
			3	0	2	5	0	0	7
			4	0	2	0	0	0	2
			5	0	1	0	1	0	2
		Total							48
	excellent	stage of change	1	2	10	4	2		18
			2	4	8	7	1		20
			3	1	10	2	0		13
			4	0	4	4	1		9
			5	4	6	2	0		12
		Total							72
excellent	low	stage of change	1			1			1
		Total							1
	average	stage of change	1		2				2
			2		1				1
		Total							3
	high	stage of change	1		2	2	1		5
			2		2	1	0		3
			3		1	0	0		1
		Total							9
	excellent	stage of change	1	0	2	1	1		4
			2	1	2	4	0		7
			3	0	0	1	0		1
			5	0	1	1	0		2
		Total							14

1 = Pre contemplation **2 = Contemplation ***3 = Preparation ****4 = Action *** 5 = Maintenance*

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